TRANSMISSION OIL COOLER

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority of Korean Application No. 10-2003-0042530, filed on June 27, 2003, the disclosure of which is incorporated fully herein by reference.

FIELD OF THE INVENTION

[002] The present invention relates to an oil cooler, and more particularly, to a transmission oil cooler for a vehicle.

BACKGROUND OF THE INVENTION

[003] Generally, a transmission is connected to an output side of an engine of a vehicle such that driving force generated from the engine is transferred to the driving wheels through the transmission. When transferring the driving force, a plurality of gears provided within the transmission are meshed with each other. Accordingly, a great quantity of heat is emitted therefrom and wear of the gear teeth occurs.

[004] In order to absorb the emitted heat and to prevent the gear teeth from wearing, transmission oil circulates through the transmission, and an oil cooler is connected to the transmission. The transmission oil, which absorbs heats from the

transmission, is cooled in the transmission oil cooler by heat exchange with induced air, and after being cooled it is again input to the transmission.

[005] A conventional transmission oil cooler has an inlet terminal and an outlet terminal for the transmission oil flow.

[006] A plurality of tube plates, which are connected to the inlet terminal and the outlet terminal, are vertically stacked such that a space for mounting an outer fin and a passage for transmission oil flow are alternatively formed between the tube plates. Furthermore, an inner fin is mounted in the passage. Embossed portions are formed on the inner surface of the tube plate and the tube plates are welded to each other such that the embossed potions are also vertically welded to each other. Accordingly, the heat contained in the transmission oil flowing in the passage is firstly transferred to the inner fin and secondly transferred to the outer fin through the tube plate such that the transmission oil is cooled by heat exchange between the induced air and the outer fin.

[007] However, when the tube plate is manufactured utilizing a metallic pattern or the tube plates are welded to each other, stress is concentrated at the embossed portions such that a crack can form at the embossed portion. Accordingly, transmission oil flowing in the passage can permeate through the crack, and the seal of the transmission oil cooler is not guaranteed.

SUMMARY OF THE INVENTION

[008] An exemplary transmission oil cooler for a vehicle according to an embodiment of the present invention comprises a pair of tube plates, each of which has a oil inlet and a oil outlet at ends thereof, and which are welded to each other. An inner

fin mounted in an oil flow passage is formed between the tube plates for absorbing heat emitted from the oil and transferring the absorbed heat to the tube plates. A pair of stoppers are respectively mounted on an edge portion of the inlet and the outlet for fixing the ends of the inner fin thereto.

[009] Preferably, the oil inlet and the oil outlet are shaped as a cup. Preferably, the inner fin is bent at the edge portion corresponding to the shape thereof.

[0010] In a further embodiment, the stopper comprises a supporting portion connected to the inside of the cup-shaped inlet and the cup-shaped outlet. A lip portion protrudes from the oil inlet and the oil outlet for respectively receiving the ends of the inner fin.

[0011] Preferably, the ends of the inner fins is are concave-shaped and the lip portion for receiving the ends of the inner fin is convex-shaped corresponding to the shape of the ends of the inner fin.

[0012] Preferably, the stopper and the tube plate are formed as one body.

[0013] Embodiments of the present invention thus provide a transmission oil cooler having non-limiting advantages of enhancing the cooling performance and guaranteeing a seal without transmission oil leakage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrates an embodiment of the invention, and together with the specification, serve to explain the principles of the invention.

[0015] FIG. 1 is a partial cross-sectional view of a transmission oil cooler according to an embodiment of the present invention.

[0016] FIG. 2 is an assembly view of the of tube plates of the transmission oil cooler of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] An embodiment of the present invention will hereinafter be described in detail with reference to the accompanying drawings.

[0018] As shown in FIGS. 1 and 2, a transmission oil cooler 10 according to an embodiment of the present invention has an inlet terminal 52 and an outlet terminal 54 for the transmission oil flow. A plurality of tube plates 56, which are are connected to the inlet terminal 52 and the outlet terminal 54, are vertically stacked such that, a space for mounting a outer cooling fin 60 and a passage 56a for transmission oil flow is are alternatively formed. Furthermore, an inner fin 58 is mounted in the passage 56a. Accordingly, the heat contained in the transmission oil flowing in the passage 56a is firstly transferred to the inner fin 58 and secondly transferred to the outer fin 60 through the tube plate 56 such that the transmission oil is cooled by heat exchange between the induced air and the outer fin 60.

[0019] A cup-shaped inlet 57a is formed in one end of the tube plate 56, and a cup-shaped outlet 59a is formed in the other end of the tube plate 56. In each end of the cup-shaped inlet 57a and a cup-shaped outlet 59a, holes 57b, 59b for transmission oil flow are respectively formed. The diameters of the cup shape of the inlet 57a and the outlet 59a is decreased as the distance from the tube plate increases. Each stopper 70 is

mounted on the top edge of the cup-shaped inlet 57a and the cup-shaped outlet 59a such that the ends of the inner fin 58 is are fixed to the stopper 70. The stopper 70 is bent at the portion contacting with the edge of the cup-shaped inlet 57a or the edge of the cup-shaped outlet 59a. The stopper 70 comprises a supporting portion 70a and a lip portion 70b. The supporting portion 70a is fixed to the inside of the cup-shaped inlet 57a or the inside of the cup-shaped outlet 59a, and the lip portion 70b protrudes in a direction toward the passage 56a for fixing the end of the inner fin 58. The stopper 70 is welded to the tube plate 56, or is formed as one body with the tube plate 56.

[0020] Both ends of the inner fin 58 are concave-shaped such that the inner fin 58 extends around the cup-shaped inlet 57a and the cup-shaped outlet 59a for increasing the amount of transferred heat. Accordingly, in the lip portion 70b of the stopper 70 for fixing the inner fin 58, the contacting portion with the inner fin 58 is convex-shaped corresponding to the shape of the inner fin 58. The inner fin 58 is mounted between the tube plates 56, and the each end of the inner fin 58 is received into the lip portion 70b such that the inner fin 58 is longitudinally and transversely fixed in the passage 56a formed between the tube plates 56.

[0021] According to the transmission oil cooler of this invention, because of the expanded inner fin, the amount of heat transferring heat from the transmission oil to the inner fin increases such that the performance of the cooler is enhanced.

[0022] Furthermore, the seal between the tube plates is reinforced such that the oil leakage from the passage formed between the tube plates is prevented.